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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : <b>B42D 15/00</b>		A1	(11) International Publication Number: <b>WO 98/19869</b> (43) International Publication Date: <b>14 May 1998 (14.05.98)</b>
<p>(21) International Application Number: <b>PCT/NL97/00604</b></p> <p>(22) International Filing Date: <b>4 November 1997 (04.11.97)</b></p> <p>(30) Priority Data: 1004433                    5 November 1996 (05.11.96)            NL</p> <p>(71) Applicant (<i>for all designated States except US</i>): INDUSTRIAL AUTOMATION INTEGRATORS (IAI) B.V. [NL/NL]; De Run 6509, NL-5504 DR Veldhoven (NL).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (<i>for US only</i>): COBBEN, Johannes Ignatius, Marie [NL/NL]; Berthastraat 11, NL-5507 LT Veldhoven (NL). ELENBAAS, Abraham [NL/NL]; Vorenseindeweg 34, NL-4714 RH Sprundel (NL).</p> <p>(74) Agent: EVELEENS MAARSE, Pieter; Arnold &amp; Siedsma, Sweelinckplein 1, NL-2517 GK The Hague (NL).</p>		<p>(81) Designated States: CA, CN, JP, RU, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published <i>With international search report. In English translation (filed in Dutch).</i></p>	
<p>(54) Title: SECURITY FEATURE COMPRISING A PERFORATION PATTERN</p> <p>(57) Abstract</p> <p>The invention relates to a document to be protected against forgery, comprising a security feature in the form of a perforation pattern, wherein the perforation pattern extends over a surface of the document and represents an image comprising brightness tones. The perforation pattern is herein formed such that, for instance when the thus treated document is held up to the light or placed on a light box, an image becomes visible at the location of the perforation pattern. It will be apparent that arrangement of such an image representing brightness tones requires extremely advanced technologies. Such technologies are not easily accessible to potential forgers, so that documents thus provided with such a perforation pattern are very difficult to forge. The perforation pattern is preferably applied by means of laser light.</p>			

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## SECURITY FEATURE COMPRISING A PERFORATION PATTERN

The present invention relates to a document to be protected against forgery, comprising a security feature in the form of a perforation pattern.

Such a document is known from the international patent application PCT/NL95/00119.

In this prior art document the perforation pattern takes the form of a character or a number of characters. This perforation pattern is herein applied in the form of round, rectangular, or character-like perforations. These 10 perforation patterns are therefore always representations of a black and white image without intensity differentiation.

Although making these perforations already raises a considerable barrier for potential forgers, there exists 15 a need for a security feature which is even more difficult to forge.

This object is achieved in that the perforation pattern extends over a surface of the document and represents an image comprising brightness tones.

20 The perforation pattern is herein formed such that, for instance when the thus treated document is held up to the light or placed on a light box, an image becomes visible at the location of the perforation pattern.

It will be apparent that arrangement of such an 25 image representing brightness tones requires extremely advanced technologies. Such technologies are not easily accessible to potential forgers, so that documents thus provided with such a perforation pattern are very difficult to forge.

30 The perforation pattern is preferably applied by means of laser light.

This measure has the advantage that at the position of the perforation the material, for instance paper, plastic or textile is completely removed, so that when

for instance the fingertips brush over the document no elevation or channel or burr can be felt at all.

5 If for instance a perforation pattern were to be applied by forgers by means of for instance conically formed needles, cup-shaped edges or burrs are always created which are easily discernible with the fingertips. This therefore provides a good means of identifying possible forgeries.

10 According to yet another preferred embodiment, the perforation pattern is a representation of an image arranged on the document by means of a different technique.

15 Owing to the possibility of visually comparing the image and the perforation, thus without the deployment of complicated assist means being required, a less than perfect forgery of just one of the two becomes immediately recognizable. A high degree of security against fraud is thus obtained.

20 This measure requires that, in order to make such a document, there must be present means for making the perforation pattern and means for making the associated image with a different technique, respectively means for recording this image and putting it into digital form to enable control of the means necessary for making a perforation pattern.

25 According to yet another preferred embodiment, the image arranged by means of a different technique is specific to the document. This provides the option of personalizing the document. It will be apparent that this results in an even higher level of security.

30 An important application of the present invention lies in the fact that the document is a passport and that the image is a passport photograph.

35 Other preferred embodiments are stated in the remaining sub-claims. It is pointed out here that the invention also relates to a method for applying a security feature in the form of a perforation pattern in a document, wherein the perforation pattern is applied by a

laser device which is adapted to successively apply a perforation pattern in the document, wherein the size of the perforation holes or the density of the perforation holes is controlled by means of an electronic representation of the image.

The present invention also relates to a device for performing such a method.

The present invention will be elucidated hereinbelow with reference to the annexed figures, in which:

10 figure 1 shows a schematic perspective view of a device for manufacturing a document according to the present invention;

figure 2 shows a detail view of a perforation pattern such as illustrated in figure 1;

15 figure 3 is a schematic perspective view of a passport according to the present invention;

figure 4 shows a view of a bank note provided with a pattern according to the present invention; and

20 figure 5 shows a postage stamp provided with a perforation pattern according to another embodiment of the present invention.

Before discussion of the technique, it is pointed out that in the present technique the making of brightness tones, as in the graphic art, is possible by means of perforations which are applied according to a fixed grid, wherein the size of the perforations is a measure for the intensity and that it is also possible to reproduce brightness tones by making use of perforation holes of equal dimensions, wherein the density of these dimensions is a measure for the intensity. Both options can in principle also be combined.

It is pointed out here that in the graphic art the first option is equivalent to the manner in which black and white photographs are reproduced in newspapers and 35 that an example of the second technique can be found in the series of Netherlands postage stamps in which the likeness of Her Majesty the Queen is represented by dots of varying density.

Shown in figure 1 is a video camera 1 which is directed at a passport photograph 2. Video camera 1 records the image of passport photograph 2, converts it into an electronic form and feeds the thus obtained signal to a computer 3 in which it is stored.

The device shown in figure 1 further comprises a laser beam generating means 4 which is controlled by computer 3. This control relates not only to the intensity and focussing of the laser beam 5 transmitted by laser device 4, but also to the direction in which laser beam 5 is transmitted. It is possible to vary this direction in two planes to apply a perforation pattern 7 in a document 6.

It is pointed out here that such laser devices are known in the prior art; in order to change the laser light beam use is herein made of mirror systems not otherwise shown in figure 1.

It is also possible to have laser device 4 stand still and to cause a carrier on which document 6 is placed to move. It is also possible to cause the carrier to move in one direction and the laser beam in the other direction; the choice between the various possibilities depends on the technology used.

Essential is however that perforation pattern 7 comprises perforation holes of differing diameter, wherein the diameter is a function of the brightness to be represented in the image. Perforation holes of differing density can be made by causing the laser beam to generate more or fewer holes locally.

This is illustrated more clearly in figure 2, which shows a detail of perforation pattern 7. Herein can be seen that in the present embodiment the perforation pattern is formed by perforation holes 8 which are ordered in a regular grid, for instance a rectangular grid. The dimension of the holes is herein a measure for the brightness of the image represented by perforation pattern 7, in the present case the passport photograph 2. It is noted here that the dimensions of the perforation

holes can be adjusted continuously, thus in principle in analog manner; by processing with a digital computer a finite, yet large number of stages is however obtained. Tests have demonstrated that it is nevertheless possible 5 to obtain a representation of an image which forms an adequate rendering of the relevant image and can be easily compared therewith.

It will be apparent that in this manner a good 10 authenticity feature is obtained which is difficult to copy.

Shown in figure 3 is a passport 9 in which the photograph 2 is fixed, for instance by means of glue, tubular rivets or other manner of attachment. On the same page, adjacently thereof, a perforation pattern 7 representing the relevant image is applied. A good comparison 15 can be made by holding up the relevant page of the passport to the light.

It is otherwise also possible to apply the perforation pattern on another page of the passport, provided a 20 quick visual comparison is possible. This makes forgery more difficult since at least two different pages must be forged for this purpose. It is also possible to apply the image enlarged, reduced in size or modified in other manner.

Figure 4 shows a banknote 10 which is provided with 25 a perforation pattern 11, in the present case in the form of an owl. This perforation pattern is not related to another image arranged on the banknote but forms exclusively a security feature per se; it is possible to 30 provide banknotes with such a security feature. It is again pointed out that the difference with the prior art lies in the fact that the image 11 represents different brightness tones, for instance grey tones. Use is otherwise made herein of a free grid, wherein the dimensions 35 of the perforations are the same and the density of the perforations varies in order to represent the grey tones.

The same applies for the postage stamp 12 shown in figure 5 which is provided with a perforation pattern 13

in the form of a likeness of Her Majesty the Queen; both forms are herein combined, i.e a varying grid, wherein the dimensions of the perforations also differ.

**CLAIMS**

1. Document to be protected against forgery, comprising a security feature in the form of a perforation pattern, **characterized in that** the perforation pattern extends over a surface of the document and represents an image comprising brightness tones.  
5
2. Document as claimed in claim 1, **characterized in that** the image is visible when the document is illuminated from the rear.
3. Document as claimed in claim 1 or 2, **characterized in that** the perforation pattern is applied by means of laser light.  
10
4. Document as claimed in claim 1, 2 or 3, **characterized in that** the perforation pattern is a representation of an image arranged on the document by means of a different technique.  
15
5. Document as claimed in claim 4, **characterized in that** the image arranged by means of a different technique is specific to the document.
6. Document as claimed in claim 5, **characterized in that** the document is a passport and that the image is a passport photograph.  
20
7. Document as claimed in claim 6, **characterized in that** the security feature is applied on a page of the passport other than the page on which the passport photograph is arranged.  
25
8. Document as claimed in any of the foregoing claims, **characterized in that** the brightness tones of the image are represented by means of the size of the perforations.
9. Document as claimed in any of the foregoing claims, **characterized in that** the brightness tones are represented by means of the density of the perforations.  
30
10. Document as claimed in claim 8 or 9, **characterized in that** the light tones are represented by large perforation holes respectively a high density of perforation holes and that dark tones are represented by small  
35

perforation holes respectively a low density of perforation holes.

11. Method for applying a security feature in the form of a perforation pattern in a document, characterized in that the perforation pattern is applied by a laser device which is adapted to successively apply the perforation pattern in the document, wherein the size of the perforation holes or the density of the perforation holes is controlled by means of an electronic representation of the image.

10 12. Method as claimed in claim 11, characterized in that the document is a passport and that a perforation pattern is applied in the passport which is a representation of the passport photograph arranged in the passport.

15 13. Method as claimed in claim 12, characterized in that the passport photograph is put into digital form by means of an optical electronic device and that the perforation pattern is applied on the basis of the digital reproduction of the passport photograph.

20 14. Method as claimed in claim 13, characterized in that the passport photograph is arranged in printed form in the passport.

15. Device for performing the method as claimed in any of the claims 11-14.

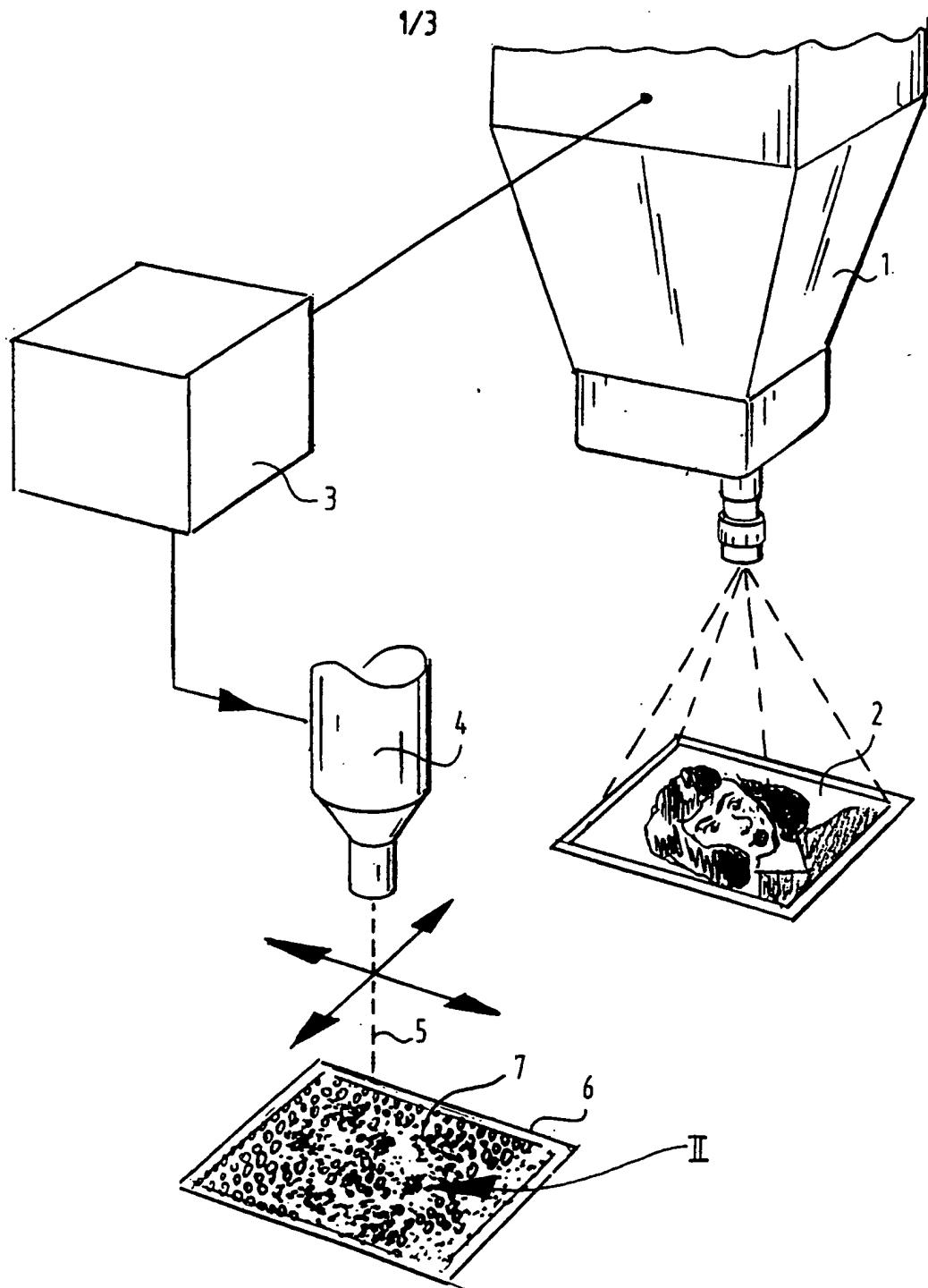
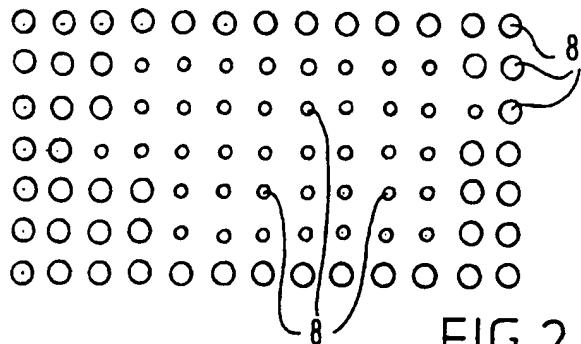
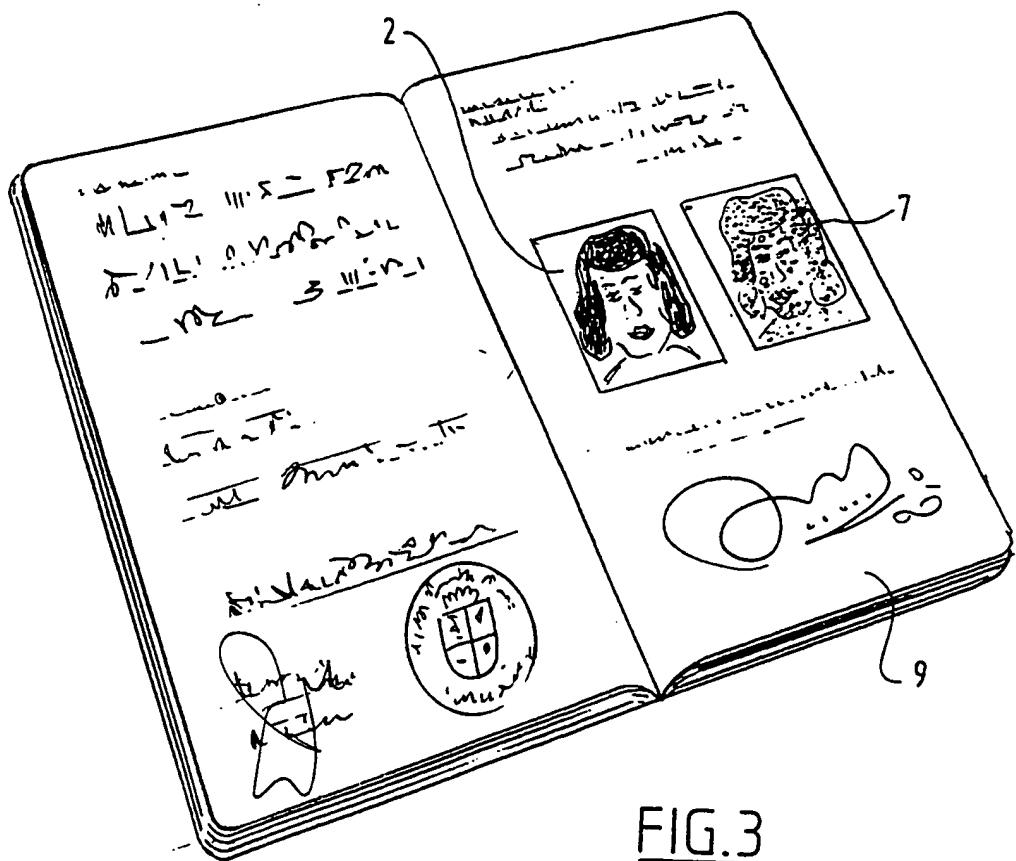
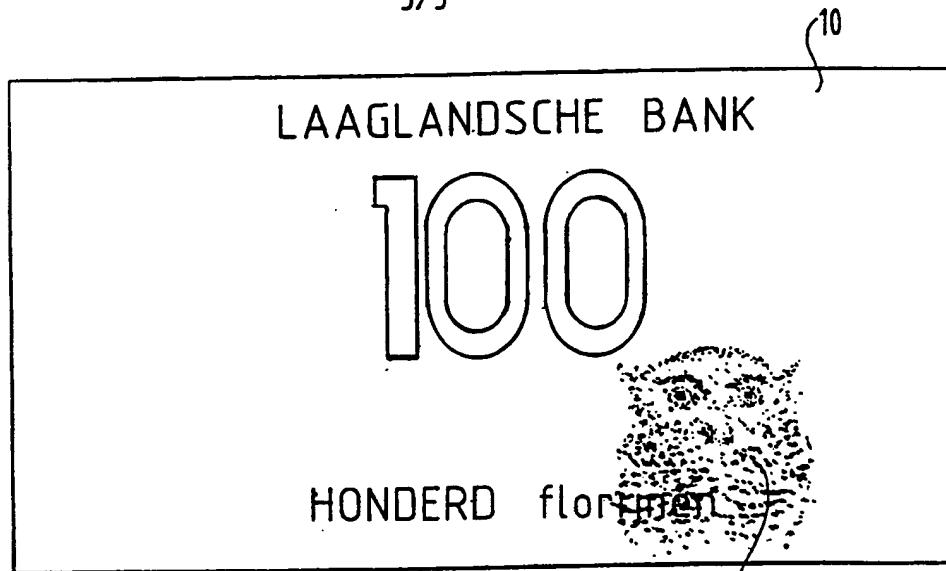
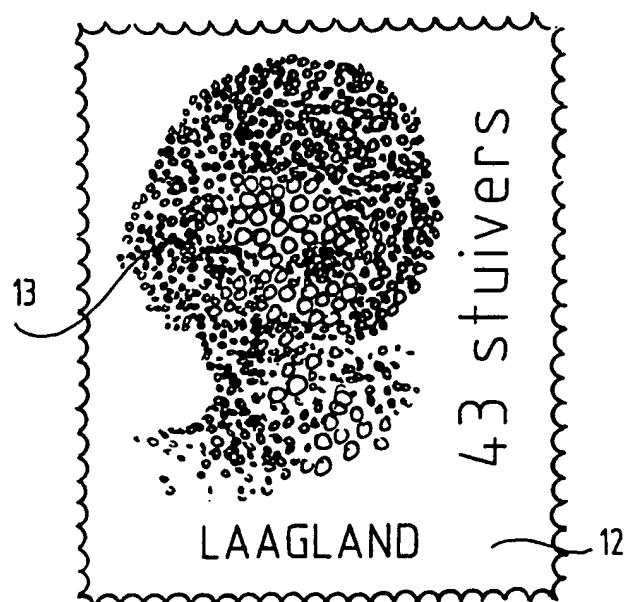


FIG.1

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FIG.2FIG.3

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FIG.4FIG.5

# INTERNATIONAL SEARCH REPORT

Inte...nal Application No  
PCT/NL 97/00604

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 6 B42D15/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B42D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 93 15 294 U (HÖLSCHER) 17 February 1994 see the whole document ---	1
Y	WO 95 26274 A (INDUSTRIAL AUTOMATION INTEGRATORS) 5 October 1995 cited in the application see the whole document ---	2-4
A	EP 0 523 304 A (EPC TECHNOLOGY CO.) 20 January 1993 see column 3, line 9 - column 4, line 1; figures 1-3 ---	6,7
P, X	WO 97 18092 A (ORELL FÜSSLI BANKNOTE ENGINEERING) 22 May 1997 see page 4, line 9 - page 7, line 4; figures 1-4 -----	1-5,8-10

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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1

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 9315294 U	17-02-94	NONE	
WO 9526274 A	05-10-95	NL 9400498 A EP 0748286 A	01-11-95 18-12-96
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